**<u>Short Statement on MPM</u>**

Dr. M. Patrick McCormick, a professor of physics and co-director of the Center for Atmospheric Sciences at Hampton University, is internationally known as a pioneer in remote sensing of the atmosphere. Dr. McCormick developed a series of satellite occultation experiments lasting more than two decades in orbit that produced the "gold standard" for measuring ozone in the stratosphere. These experiments provided data essential for identifying the impact of human activities on ozone and were used to establish whether the worldwide protocols for controlling chlorofluorocarbon (CFC) releases into the atmosphere were slowing or stopping ozone depletion. Additionally, his discovery and naming of polar stratospheric clouds in the polar regions were critical to understanding how the ozone hole forms. His ozone work was instrumental in convincing chemical manufacturers to agree to control emissions of CFCs.

Dr. McCormick also pioneered laser instruments to study Earth's atmosphere. The technique called lidar, is similar to radar, but uses laser frequencies. Over the last 42 years he has developed ground-based, airborne and satellite-borne lidars. The data from these experiments have been exceedingly important for understanding how particles and clouds in the atmosphere affect global climate. His NASA LITE experiment aboard the Shuttle Discovery was the first atmospheric lidar to orbit Earth. It produced unique data on hurricanes, desert dust, biomass smoke, clouds and pollution plumes and paved the way for the NASA-CNES CALIPSO satellite mission launched April 28, 2006. CALIPSO is a lidar mission whose central theme is to provide data to better understand our climate.

**Principal and Excelling Contributions of MPM.**

The discovery of the ozone hole over Antarctica in 1985, with springtime losses on the order of 50% in total ozone overhead, created an enormous interest in the global environmental community. It is known that stratospheric ozone depletion increases the amount of harmful ultraviolet light falling on the Earth with the potential for creating increased skin cancer and other deleterious effects. Prior to this finding, theories suggested that only a few percentage decrease in ozone would occur and on a more global basis. Dr. McCormick's pioneering discovery and naming of Polar Stratospheric Clouds, or PSCs, and their characteristics and distribution, were key and necessary in the successful solution of how the ozone hole forms. Not only did he document PSCs with his satellite sensors, but he participated in field missions over the Antarctic, and later the Arctic, with airborne lidar systems he developed to provide even a closer and more detailed look at these special clouds. He worked collaboratively with world-class scientists, theorists and experimentalists in helping to find the solution to how the ozone hole forms. He later provided global data on volcanically-produced aerosols that have the potential through heterogeneous chemistry to produce ozone depletion not only in polar-regions but globally. McCormick's data and collaboration with theorists were critical to international protocols and agreements to limit the use and, therefore, emission of specific chlorofluorocarbons (CFCs) into the atmosphere. In addition, his SAGE series of satellite experiments has become the most robust global data set on ozone and has been used in every international assessment on the state of ozone. These data have shown ozone depletion to have lessened over the last five or so years, no doubt a result of the controls on ozone depleting CFCs. His SAGE II ozone measurements lasted for over 20 years. His SAGE III instrument, with over 800 channels and the capability to make lunar and solar occultation and limb scattering measurements, was launched on a Russian spacecraft in 2001 and operated until late 2005 providing additional crucial ozone, aerosol, and other measurements.

Not only has Dr. McCormick made critical contributions to ozone research; his data on aerosols and clouds, along with ozone and water vapor, have been exceedingly important to climate research. Arguably, the most important environmental issue facing humans today is greenhouse warming. Is our Earth warming? Will the sea-level rise in the future due to the melting of our polar ice sheets? In order to answer these questions with more specificity, exacting global data on aerosols and clouds are needed. Aerosols and specific gases like C02 force the climate to cool or warm. Water vapor and clouds change based on atmospheric temperature and are called feedbacks. The lidar and occultation data sets Dr. McCormick has produced over his career have helped put limits on climate predictions. For example, his global quantification of aerosols produced by volcanic eruptions has been used to test what global climate models (GCMs) would predict based on an increased aerosol in the stratosphere. Temperature measurements showed that surface cooling occurred for a few years after the 1991 eruption of the volcano Pinatubo in the Philippines and that a warming occurred in the stratosphere where the aerosols resided. Dr. McCormick’s aerosol data were used in GCMs which showed a similar temperature response. Likewise, his water vapor data have been used to understand this most important climate feedback and, therefore, climate sensitivity. These data and the data being obtained from the recently launched CALIPSO lidar will be critical to understanding and predicting future climate.

As a scientist and experimentalist, Dr. McCormick is deeply interested in making a contribution to society. As a professor at Hampton University, a Historically Black University, he is also committed to offering new opportunities for and educating his students in the atmospheric sciences and instilling in them the important role that science plays in solving key environmental issues.